Comparison of QC Requirements in 18th, 19th, 20th, and 21st Editions of *Standard Methods* Part 1020

Part 1000 QA/QC Requirements	18th Ed.	19th Ed.	20th Ed.	21st Ed.
QA Manual	A QA plan is required. Generalized information is given as to what should be included. (SOPs, organizational charts, training requirements, equipment preventive maintenance procedures, corrective actions, internal QC activities, calibration procedures, performance audits, data assessment and reporting procedures.	Same as 18th.	-QA Manual and SOP have very specific requirements of what must be included. (Both mirror NELAC Chapter 5 requirements.) -Reference materials must be NIST traceable. -Logbooks must be maintained for each procedure performed.	Same as 20th.
Certification of Operator Competence [18th & 19th] **Initial Demonstration of Capability** [20th]	4 replicate analyses of independently prepared check sample. Conc. between 5 and 50 times MDL. Recovery ± 10% (BOD is ± 20%)	Same as 18th.	-Must include RB and 4 LFBs spiked between 10X MDL and midpoint of curve. -Recovery must meet acceptance criterion of method or at least 80-120%. -RB can not be above 50% of Limit of Quantitation (MQL) or method specified level.	Same as 20th.
Method Detection Limit (MDL)	Not required.	Same as 18th.	DEQ is not requiring MDLs for Wastewater analyses.	DEQ is not requiring MDLs for Wastewater analyses.
Reference Materials	Certified, NIST samples preferred	Same as 18th.	Reference materials must be either NIST or NIST traceable.	Same as 20th.
Reagent Blanks (RB)	-Analyze if new reagents are used. -At least 5% of sample load must be RBs.	Same as 18th.	-One RB with each sample batch or 5% of sample load, whichever is more frequent. -Analyze RB after daily calibration standard. -Samples associated with a contaminated blank must be re-prepared and re-analyzed.	Same as 20th.
Reagent Water	Lists quality of water as Type I, II, and III	Same as 18th.	Quality of water is changed to High, Medium, Low	Same as 20th.
Laboratory-Fortified Blank (LFB)	Not required.	Same as 18th.	-One per batch or 5% of samples, whichever is greater. -Conc. 10X MDL, midpoint of curve, or as specified by method. -Source different from standards.	Same as 20th.

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Known Additions/ Laboratory Fortified Matrix (LFM / MS)	-Recovery usually 80-120%. -New matrix types must be spiked. -If no dups, 10% of samples; if dups and spikes, 5% of samples. -Spike conc. between 5 and 50 times MDL or 1 and 10 times ambient sample level, whichever is greater.	Same as 18th ~~but without specified recovery levels. Control charts used to establish acceptance criteria~~. [*Control charts not required for wastewater analyses*.]	-Spike must be added prior to sample preparation. -One per batch or 5% of samples, whichever is greater. -Conc. 10X MDL, midpoint of curve, or as specified by method. -From source different from standards. -[*May use 80-120% recovery in place of control charts for wastewater analysis*.] Use method specific acceptance criteria if tighter than 80-120%.	Same as 20th.
Laboratory Fortified Matrix Duplicate/ Duplicate Sample	-5% or more of samples must be dups. -Recovery usually 80-120%.	Same as 18th ~~but without specified recovery levels. Control charts used to establish acceptance criteria~~. [*Control charts not required for wastewater analyses.]*	-Spike must be added prior to sample preparation. -One per batch or 5% of samples, whichever is greater. -At least one dup or LFM dup per batch or 5%, whichever is more frequent. -From source different from standards. -[*May use 80-120% recovery in place of control charts for wastewater analysis*.] Use method specific acceptance criteria if tighter than 80-120%.	Same as 20th.
Externally Supplied Standard	-When spike (LFM / MS) fails or once each day, whichever is more frequent. -Between 5 and 50 times MDL or near ambient sample level. -Source different from standards.	Same as 18th.	-Used for LFB and LFM / MS. -Source different from standards.	Same as 20th.
Laboratory Check Samples [20th]	Not included.	Not included.	-Prepared by outside agency or blind additions prepared independently within the laboratory. -Performed periodically -Recovery must be within the established method acceptance range.	Same as 20th.
Performance Evaluation Samples [18th & 19th]	-Prepared by outside agency or blind additions prepared independently within the laboratory. -Recovery must be within established method uncertainty.	Same as 18th.	Renamed Laboratory Intercomparison Sample.	Same as 20th.

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Laboratory Intercomparison Samples	-Obtain from a commercial source or governmental program. -Quarterly analyses are considered reasonable.	Same as 18th.	-Semi-annual analyses are customary. -Obtain from a commercial source or governmental program.	Same as 20th.
Calibration	-3 different dilutions of standards. -Unless linear dynamic range is established, can't report above high std. -Linear curves only.	Same as 18th.	-Minimum of 3 standards for linear curves. -Minimum of 5 standards for nonlinear curves. -Lowest conc. is at reporting limit. -Calibration std. conc. must be no more than one order of magnitude between standards. -Curves may be linear through the origin, linear not through the origin, or nonlinear through or not through the origin. Some nonlinear functions can be linearized through mathematical transformations, e.g. log. -Linear regressions: -should have correlation coefficient of ≥0.995. -each point must be compared to the curve and recalculated. If not within method acceptance criteria, must correct problem prior to sample quantitation. -Perform initial calibration when instrument is set up and whenever calibration verification criteria are not met.	Same as 20th. NOTE: Part 4000 requires daily calibration.
Calibration Verification	-Verify daily with one or more standards within linear range.	Same as 18th.	-One standard at or near mid-point of curve. -Frequency based on time or number of samples analyzed. -Use acceptance criteria found in method.	Same as 20th.
Performance Audits	-Unscheduled audits only.	Same as 18th.	-Divides Performance audits into Compliance and Quality System audits. -All major elements of quality system must be audited at least annually. -Scheduled.	Same as 20th.